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ADDRESS OF THE RETIRING PRESIDENT.

W. A. HARSHBARGER, Professor of Mathematics, Washburn College.

ON this, the forty-seventh anniversary of the Kansas Academy of Science, we stand on that ever-advancing line called the present, and eagerly look forward into that unknown realm called the future, where lies all that we wish to accomplish. In the immediate foreground we can clearly see things that we wish to accomplish—changes in our environment that will benefit us as an organization and lead to larger future usefulness to the state. In planning our future policy we may gain inspiration and breadth of view by a brief review of the past, or, so to speak, taking a hasty inventory. In this review it is neither possible nor desirable to enter into details. This has been done by Doctor Thompson, Professor Wooster and others, and is recorded in our Transactions. We shall note briefly the beginnings of the Society, with the beginnings and progress of some lines of investigation that have been carried through a series of years to logical completion, or are still in progress.

The conception and organization of the Kansas Academy of Science, or the Kansas Natural History Society, as it was named until the fourth annual meeting, 1871, has been fully treated in the address of the retiring president, Dr. A. H. Thompson, October 21, 1883. It is my purpose to relate very briefly the main points in the organization, and pass at once to the work accomplished by the Society.

In 1867 Prof. J. D. Parker was called to Lincoln College (now Washburn). Observing that there was no scientific association in the state, and that the scientists then at work had no organization to centralize their work and no uniform method of publication, he at once began to agitate the matter of forming such an organization, but received no encouragement. People were busy with other things, and science received but little attention. Finally he wrote to Professor Mudge, who was heartily in favor of such a society, but feared the time was not ripe, giving as one of his reasons that Professor Winchell had made a similar attempt in Michigan and had failed. Professor Parker visited Professor Mudge during

the long vacation of 1867, and after thorough discussion of the matter secured Professor Mudge's promise to go into the movement. Several articles were then published urging the importance of such an organization, and in the *Journal of Education* for March, 1868, Professor Parker published the following notice:

"We, the undersigned, desirous of securing the advantages arising from the association in scientific pursuits, and of giving a more systematic direction to scientific research in our state, do hereby invite all persons in the state interested in natural science to meet at Topeka on the first Tuesday of September next, at three p. m., at the College building, for the purpose of organizing a State Natural History Society."

This call was signed by the following seventeen persons: John Fraser, D. H. Robinson, B. F. Mudge, J. A. Banfield, J. S. Hougham, J. D. Parker, R. A. Barker, D. Brockway, G. E. Chapin, J. H. Carruth, R. D. Parker, Jeff. Robinson, Peter McVicar, F. H. Snow, J. S. Whitman, Richard Cordley, J. R. Swallow. The meeting was held at the appointed time, with a very small attendance, and the organization effected. The name chosen, Kansas Natural History Society, was adopted from the Illinois Natural History Society, of which Professor Parker had been a member. The following officers were elected: President, B. F. Mudge; vice president, J. S. Whitman; secretary, J. D. Parker; treasurer, F. H. Snow; curator, J. A. Banfield. No papers were read at this meeting.

The second meeting was held at Topeka September 7, 1869, with a very small attendance. The following papers were read: "On the Internal Heat of the Earth," by B. F. Mudge; "On Solving the Higher Equations," by Edward Cove. A public lecture on "The Moundbuilders" was given by J. D. Parker. The officers of the previous year were reelected. The attendance at this meeting was so small and the state of the treasury so unsatisfactory that a general feeling of gloom and doubt as to the existence of the Society was very evident. Here, as on so many other occasions, the energy and optimism of Professor Mudge came to the rescue. He urged the members not to despise the day of small things, and to never say fail until they had really failed. The Society was unanimously invited by the three professors of the State University to hold the next meeting in Lawrence, and the invitation was gladly accepted.

The third meeting was held in the University building at

Lawrence, September 5 and 6, 1870. This meeting proved to be the turning point in the life of the Society. The following papers were read:

On the Plants of Kansas. J. H. Carruth.

On the Fishes of the Kansas River as Observed at Lawrence. F. H. Snow.

On the Internal Heat of the Earth. J. D. Parker.

On the comparison of the Coals of Kansas with Other Western Coals. W. H. Saunders.

On the Saurian Formation of Kansas. B. F. Mudge.

On the Moss Agate Formation of Kansas. B. F. Mudge.

The following public lectures were delivered:

On Aims, Organization and Advantage of Scientific Association. John Fraser.

On Hugh Miller, or the Workingman's Education. J. H. Burrows.

At this meeting resolutions were presented urging the enlargement of the scope of the Society so as to include every line of scientific exploration and investigation, and to change its name to the Kansas Academy of Science. These resolutions were adopted at the fourth annual meeting, held at Leavenworth, October 25 and 26, 1871. Beginning with the third meeting, the progress of the Society was rapid, as is shown by the number of papers read, and their character.

At the meeting of the legislature in 1873 the Academy was made a coördinate branch of the State Board of Agriculture, and given permission to have its proceedings published by the state printer, and also given quarters in the Capitol building. This unsolicited act was a well-merited recognition of the work the Academy was undertaking.

Thus far I have followed the reports of the Society literally in an endeavor to show the meager beginnings, the difficulties and discouragements of the organization. The development of the state has been so rapid that it is very difficult to appreciate the conditions forty-seven years ago. The War of the Rebellion was just over. The effects of the border strife were still shown in the rifle pits along the south side of the town and the palisades still standing at Kansas avenue and Sixth street. The Union Pacific railway had reached Topeka only two years earlier, and the construction of the Atchison, Topeka & Santa Fe railway was begun that year (1868). The Indians were still on the rampage in much of the state, making travel at times exceedingly hazardous. The famous battle of the

Arickaree was fought in the same month in which the Society was organized, and Sheridan's winter campaign, in which the Nineteenth Kansas participated, and which broke the strength of the Plains tribes, occurred the following winter. Small wonder that the advance of scientific investigation was slow and that people expressed small interest in such work. The people generally were fully occupied earning the necessities of life. So we find a very small band of investigators on the 82,000 square miles that was the foundation of a great state yet to be, but not yet arrived. This area was covered with a vegetation largely unknown, an unknown population of birds, mammals, fishes, reptiles and insects, while the mineral resources were but a guess. Clearly the first work needed was an inventory, and it was along this line that the members proceeded. It is true that some work had been done, but the condition of the scientific knowledge of the state is vividly portrayed in an article in the *Journal of Education* a little previous to this time, in which the importance of a geological survey was urged. This article advanced the argument that if such a survey only succeeded in discovering coal and salt it would richly repay the cost.

With this hasty view of the condition of the state at the time of the organization of the Academy it is my purpose to show from the Transactions how the Academy has made definite contributions to the much-needed scientific knowledge. I find myself embarrassed with a wealth of material. It will be impossible to do justice to the individual workers. I can only mention the names of those most prominent in the few lines I shall here record.

From the beginning of its existence, probably the most cherished ambition of the Academy was the securing of an adequate geological survey of the state. The mineral resources were practically unknown, and much money was being wasted in ventures that with fuller knowledge would have been successful, or else would not have been attempted. Hardly a meeting passed without some discussion of this topic. At the seventh meeting Professor Mudge read a very earnest paper on the importance of a geological survey of the state. At the eighth meeting a committee was appointed to draft resolutions urging such a survey, and at the ninth meeting these resolutions were adopted. At the sixteenth meeting, in the address

of the retiring president, Doctor Thompson spoke very earnestly in favor of such a survey. At the seventeenth meeting Dr. R. J. Brown chose for the subject of the president's address, "Is a Geological Survey of the State a Necessity?" Doctor Brown corresponded with officials in each state where such a survey had been made or was in progress, and thus accumulated a formidable array of evidence in favor of such a survey. Without going further into details, it is sufficient to say that after many years of urging and educational work on the part of the Academy an adequate geological survey of the state was ordered, and the dearest ideal of the Academy triumphed.

But before the survey was ordered, and during its progress, our Transactions are exceedingly rich in papers on geology in its every phase. The first paper read before the Society was a geological paper by Professor Mudge, and at each succeeding meeting up to and including the twelfth, which was the last meeting previous to his death, he read from one to four papers on geological subjects, or twenty-four papers in all. One of these was a list of Kansas minerals, the beginning of a catalogue. Professor Mudge's record is also unique in that during his entire membership he was either president or vice president continuously, and did not miss a meeting. At the fifth meeting Wm. H. Saunders presented his first paper on the analysis of coal and limestones, and followed this with other papers on analysis of coals and clays, thus giving a very practical bearing to the work. Throughout our forty-seven years of existence geological papers have formed an important part of our programs. It is difficult to pass over this part of our work without extended notice of the work of such men as Williston, Hay, Haworth, Cragin, Prosser, Grimsley, Beede, Gould, Wooster, and many others. Our Transactions contain carefully prepared lists of invertebrate and vertebrate fossils, fossil plants and leaves, lists of minerals, with many valuable papers on every branch of the subject, both economic and scientific.

At the third meeting Prof. J. H. Carruth read a paper on the plants of Kansas, in which he dwelt largely upon species common in the western states that were not found here at all. At the fourth and fifth meetings he presented papers in which a beginning was made in the identification of Kansas species.

At the sixth meeting he presented a preliminary catalogue of the plants of the state. To this catalogue he made additions each year, except 1877 and 1881, until 1889, when, so far as I can learn, his last paper was presented. Professor Carruth was assisted by many local collectors, the Academy furnishing the unifying means. In 1881 B. B. Smyth began an extensive series of contributions, particularly of the plants of the western portion of the state, which was continued until quite recent times. In 1884 Professor Kellerman presented a preliminary catalogue of the parasitic fungi of the state, with their host plants. In 1888 and 1890 Professor Swingle presented a list of Kansas species of Peronosporaceæ. In 1894 Miss Reed presented an analytic key to Kansas mosses, with a list of the known species, and to this she made subsequent additions. Also, in 1894 Professor Hitchcock presented a list of the grasses of Kansas. In 1910 B. B. Smyth and Mrs. L. C. R. Smyth presented the first part of a revised catalogue of the plants of Kansas, and in 1912 Mrs. L. C. R. Smyth presented the second part, thus bringing the work up to date. This is a bare outline of the systematic work done in botany. There were many other contributors. However, I have given enough to show that through the Kansas Academy of Science as a unifying means the state has been given a fairly exhaustive catalogue of the different forms of vegetable life, and that our Transactions furnish the record of this work carried on for about forty years. Our Transactions show also much work of a more special character, and also work of a general educational nature. The following titles illustrate this class of work:

- Black Rot of the Grape. Carpenter, 1887.
- Hackberry Branch Knot. Kellerman, 1890.
- Sorghum Smuts. Kellerman, 1891.
- Characteristics of the Sand Hill Flora. Carleton, 1889.
- Kansas Forest Trees Identified by their Leaves and Fruit. Kellerman, 1886.
- Artificial Key to Kansas Grasses. Kellerman, 1888.
- Evolution of Leaves. Mrs. Kellerman, 1890.

At the fourth meeting Professor Snow presented his first list of the birds of Kansas, to which he made many later additions. Colonel Goss, Professor Lautz and others also contributed to this list, the contributions by Colonel Goss being very extensive. So we have in our Transactions not only a very complete list of the birds of the state, but an extensive series of valuable papers on their habits and economic importance.

The work of Professors Snow and Dyche and Colonel Goss is particularly worthy of note, in that it has resulted in two splendid collections of mounted birds, the one in the museum of the State University, and the other donated to the state, and never yet adequately displayed, for want of room.

At the sixth meeting Professor Snow presented a preliminary list of the Lepidoptera of Kansas, and added to it from year to year until it is a practically complete catalogue of the Lepidoptera of Kansas.

At the seventh meeting Professor Popenoe presented a preliminary list of the Coleoptera of Kansas, and this has received extensive additions by Professor Snow, Mr. Knaus and others, and, as our program shows, is still in progress.

Professor Popenoe published a preliminary list of Kansas Hemiptera in 1884, and a list of Hymenoptera in 1885, both of which have received large additions.

Other lists published in our proceedings are: Catalogue of Kansas Mammals, by Knox; Catalogue of Kansas Fishes, by Graham; also, lists of serpents, clams, Orthoptera and Diptera, which I pass for want of time. Surely this work of classification alone would justify the existence of the Academy, and these published lists render the Proceedings very valuable; yet this is only one of a large number if lines of investigation carried on.

In meteorology the summaries published by Professor Snow formed for years the only available records on Kansas weather. This line of work was also taken up by Professor Lovewell at Topeka, and finally culminated in the establishment of a station of the United States Weather Bureau.

In chemistry, that many-sided subject, our Transactions are particularly rich. Beginning with the work of Professor Saunders in the fifth and seventh meetings, in which he presented analyses of coals, limestones and various clays, the chemists of the Academy have kept in close touch with the development of every branch of the subject, and nearly every volume of our Transactions contains valuable papers that touch our industrial development at its every point. The names of Kedzie, Patrick, Failyer, Bailey, Sayre, Willard, Franklin, Bartol, Cady, Dains, and many others are very prominent and deserve extended notice. Beginning with his paper, in 1883, on the utilization of mineral waters, Professor Bailey has pre-

sented about fifty papers, on food products, water supply, oils, and so on, but notably on foods; while Professor Sayre, beginning with his paper on loco weed in 1886, has presented about the same number, for the most part on the chemistry of drugs, spices, tea and coffee. The work of Professors Failyer and Willard is devoted largely to agricultural chemistry, in which line they have presented many papers.

In physics and engineering, our Transactions, beginning with the fifth meeting, contain a series of valuable papers by Tweeddale, Nichols, Blake, Smith, Marvin, Hoad, Murphy and many others, on a wide variety of subjects, from the theoretical to the most severely practical. Such titles as the following illustrate the character of this work:

On Ventilation. Tweeddale, 1872.

The Water Supply of Kansas. Tweeddale, 1874.

Statistics on Color-Blindness in the University of Kansas. Nichols, 1884.

Tests of Cement Manufactured in Kansas. Murphy, 1889.

Magnetic Declination in Kansas. Marvin, 1889.

Maximum Bending Moments for Moving Loads in a Draw Beam. Murphy, 1892.

Tests of Strength of Building Stones. Marvin, 1893.

Collection and Storage of Water in Kansas. Murphy, 1894.

Water Supply from a Sanitary Standpoint. Marvin, 1901.

Effect of Clay and Loam on Portland Cement. Hoad, 1904.

On Improved Water Supply for the City of Emporia. Smith, 1910.

Finally, in the forty-seven years of its existence the Academy has accumulated a library of at least 6000 bound volumes, and fully as many pamphlets. These represent the work of scientific investigators in all the leading countries, as well as our own, and form a very valuable addition to libraries of the state. This library has been secured almost entirely by exchange for the Transactions of the Academy.

I have thus sketched the growth and work of the Academy in an endeavor to emphasize the fact that from the beginning, when the state was new, and when scientific knowledge of its resources and of the composition of its plant and animal life was sadly needed, the members have attacked the problems at hand and carried them through the succeeding years, accumulating and recording knowledge of priceless value to the state. Much of the work has been classification—taking an inventory, as it were, but such work is imperative. I have also attempted to show that the Kansas Academy of Science has been the means

of unifying the work of the investigators—a central organization from which radiated the varied lines of investigation—and that in our Transactions we have in a body records that without some such clearing-house would be widely scattered, and probably many of them lost; also, without the stimulus of some such organization many of the records of work would never have been published.

Having thus reviewed the past, let us turn to the future. Has the need for such an organization ceased? The character of the work has indeed changed, but there exists even a greater need of scientific investigation, and in many more lines than in the early days of the state, and this need will increase as our civilization becomes more complex. We now have state boards, commissions, etc., that make their reports through different channels, but in each of these there are questions without number of a purely scientific character that find no place in such reports. Such questions should continue to be worked out in our meetings and the results published in our Transactions. The work in botany has changed to the search for or breeding up of plants better adapted to our economic needs, and to combating injurious parasitic forms. The immediate usable results of such work should of course be given to the people in bulletins, but the scientific investigations should not be lost. These should find a place in our Transactions. In the most ordinary experiment in plant breeding, even one that produces no commercial results of value, often some exceedingly important new facts in heredity are brought to light that should be given publicity. Then there are numberless new developments just ahead of us. What thoughtful person who considers the development in the cement industry, with its almost revolutionary effect on engineering and architectural construction, will dare to say that we have reached the limit of our mineral resources? Yet this is a thing of the present, undreamed of when the Academy was organized. Our clays have only begun to yield their wealth, and in every line we are merely at the beginning of our development of mineral resources. In engineering there is an immense field opening. We in Topeka are still buying 10-cent electricity, while the Kansas river is carrying by each day enough of the same article at 2 cents to supply our every need and add greatly to the comfort of living. Irrigation, conservation and control of flood waters are also problems of the immediate future. There

is no lack of room for work for such an organization; indeed, the amount and variety of work pushing to the front is so great as to be almost bewildering. It is clear to me that the Kansas Academy of Science has a greater opportunity to do beneficial work for the state now than it has ever before had, and this opportunity will increase with the years. It now remains for us to consider our present organization and environment, and determine the changes that would increase our efficiency.

The first thing that must appeal to us is lack of room. Crowded as we now are, even sharing our quarters with another organization, we can not command the facilities absolutely essential. We are not now and have never in our entire existence been able to arrange our library in shape for ready reference. This need, I understand, will be provided for in the quarters provided for us in the new Memorial Building, which by a happy coincidence occupies the site of the Lincoln College building, in which the Academy was organized. Whatever provision is made should include ample room for arranging our books in the most convenient and useful way; also, we should there have a complete up-to-date card catalogue, in order that our volumes may be of maximum use to the entire state.

Next, it seems to me, the Academy should have a separate existence. While we have received courteous, even generous, treatment at the hands of the Agricultural Society, of which we are a coördinate branch, and have only kind words for that society, yet there is a decided advantage in an independent existence, really an advantage to both organizations. The work of the two organizations, while somewhat related, is yet so distinct, and the methods of accomplishing this work so radically different, that I can see no gain to either organization in such a union as now exists.

Third, and most important of all, we should secure a change that will permit us to publish our Transactions annually, and as soon after the annual meeting as is possible. It is a very decided detriment to the Society to have to wait two years for their appearance. Other societies, outside our state, but with which we must in a definite way compete, publish more frequently, and thus secure members who are doing scientific work in our state, that, as I see it, ought to find a place in our

Transactions. It is a well-known fact that many workers, particularly in engineering, do not join us for this very reason. Every legitimate effort should be made to remedy this defect at the earliest possible date.

There are other minor adjustments that could probably be made with benefit to the Academy, but the above three seem to me so important that I earnestly recommend them to the careful consideration of the Academy.

With these modifications accomplished, it seems reasonable that we should be in position to largely increase our membership, and thereby the usefulness of the Academy. In three more years we will celebrate our fiftieth anniversary. Would it not be possible on that occasion to have our present membership doubled? It seems entirely reasonable to me, and worth trying. If accomplished, we could enter our second half-century with an impetus that would insure large success in our work of gathering, shaping and disseminating useful knowledge in all lines of scientific research.